22. The improved packaging material according to claim 1, wherein said polymeric material has a CO_2 transmission rate that is 3.4 to 4.0 times greater than the O_2 transmission rate.

Remarks/Arguments

Applicant thanks the Patent and Trademark Office for their careful consideration given to this application. The communication from the Office rejects claims 1 – 14, 21 and 22. The Applicant has considered the Office Action and maintains there is a fundamental difference in the referenced art and the claimed subject matter.

A telephone interview was held on Jan 29, 2003 with the inventor, Elizabeth Varriano-Marston/Attorney Scott Asmus and Patent Examiner Marc Patterson/Supervisor Harold Pyon. Several matters were discussed and a tentative agreement was achieved regarding claim 1. More specifically, the inventor explained the differences between microporous films and micorperforated films, and there was an agreement to include structural language in the claim to clarify microperforation by including the aspects of drilled holes in the non-porous films.

No claim amendments in this case were related to the statutory requirements of patentability unless expressly stated as such, and no amendment was made for the purpose of narrowing the scope of the claim unless expressly stated as necessary to distinguish over a particular reference or combination of references.

(Item 1) Withdrawn Rejection

The Applicant thanks the Office for withdrawing the previous rejections as noted on page 2 of the Detailed Action.

(Item 2) Claims Rejections - 35 USC §112 Second Paragraph

The Office rejects claims 5-6 and 9 under 35 U.S.C. §112 second paragraph for indefiniteness. As previously articulated, a §112 second paragraph rejection has two separate requirements, indefiniteness and failing to claim what applicant regards as the invention. With respect to indefiniteness, the "essential inquiry pertaining to this requirement is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of (1) the content of the particular disclosure, (2) the teachings of the prior art, and (3) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made." (MPEP §2173.02). And, there is a presumption that the claims describe the applicant's invention, absent evidence to the contrary.

Claims 5-6 include a reference to the term 'flux', which the Office acknowledges has "inherent units for a packaging material" (Office Action page 7). Thus, within the field of the invention and to those of ordinary skill in the art – the Office acknowledges that the term would be understood. However, the Office rejects the term because it "is used in many technologies other than packaging, and has different units" and believes that units are required.

As previously explained, flux for packaging material are units describing the flow of a O_2 or CO_2 through a packaging material and is expressed as cc/day-atm. For example, O_2 Flux is calculated by multiplying the OTR (oxygen transmission rate) of the film (cc/m^2-day-atm) by the surface area of the film (m^2). The calculation results in the cancellation of the area dimension so the flux units are in cc/day-atm.

The filed claims included such units as noted herein:

5. The improved packaging material according to claim 1, wherein said polymeric material provides a total O_2 Flux ranging from 150 cc/day-atm to 5,000,000 cc/day-atm.

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6. The improved packaging material according to claim 1, wherein said polymeric material provides a total O_2 Flux ranging from 200 <u>cc/day-atm</u> to 1,500,000 <u>cc/day-atm</u>.

The Applicant believes that the units are understood by those in the art and sufficiently expressed in these claims and reconsideration is respectfully requested.

Claim 9 recites the term 'semi-rigid' and the Office rejected the claim for indefiniteness for the phrase being 'relative'. The previous action includes an example of the semi-rigid product in Exhibit J that shows the product and a reference paper. The term is well known in the art in reference to the subject matter of the present invention. As noted in *The Wiley Encyclopedia of Packaging Technology*; pages 201-203, section entitled Coextrusions for Semirigid Packaging, the thickness of semi-rigid coextruded sheet is a minimum of 0.25mm. Conversion of mil and mm is simple math wherein 1 mil = 0.0254mm. The claim has been amended to recite a thickness greater than 0.25 mm to comply with the Encyclopedia definition, which the Applicant believes eliminates any relative indefiniteness and reconsideration is respectfully requested.

9. The improved packaging material according to claim 1, wherein said polymeric material is formed into a semi-rigid container with a thickness <u>greater than</u> [8 mil] <u>0.25mm</u>.

<u>*(Item 3-5) Claims Rejections - 35 USC §112 Second Paragraph*</u>

Claims 1-14 are rejected as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. In particular, the Office states that the phrase 'said set of microperforations are calculated to control' is unclear. Applicant has amended the claim to clarify that the microperforations control the packaging environment as explained in the specification.

The term 'registered target area' was rejected by the Office as being unclear in relation to the area of the packaging. The following sentences are from the specification: "Therefore, it is

important that perforations be registered in a well-defined area of the package where the likelihood of their occlusion during pack-out, storage, transportation, and retail display is minimized."; "There is a need for packaging in which the microperforations are registered in a small identifiable area that will not be blocked by adhesive labels or adjacent packages during package stacking or handling."; "Accordingly, an object of the present invention is to provide a registered microperforated polymeric packaging material with the microperforations situated in well-defined target areas of the packaging material."; "In most cases, the target area is a small identifiable area in an upper third or quarter of the package. More preferably, the registered microperforations are placed in any area that will not be occluded by produce or other packages during shipping and storage."

And as articulated in the previous response – "As described in the present application, the registered target area is a well-defined location for the microperforations as opposed to the non-localized distribution of microperforations throughout the packaging material length and width, a condition which would make the microperforations subject to occlusion. If the microperforations are not localized in a specific area, they may be blocked by labels or occluded by package-to-package contact in case carton packing. Therefore, to ensure obstruction-free microperforations and controlled oxygen transmission rates, the placement of microperforations is accomplished as described in the present application. As noted in the specification beginning on Page 9, line 16, "[i]n the preferred embodiment, the optimal size, shape and number of the set of microperforations for the particular product is used for the registered target area. In most cases, the target area is a small identifiable area in an upper third or quarter of the package. More preferably, the registered microperforations are placed in any area that will not be occluded by produce or other packages during shipping and storage."" Applicant thus feels that the term 'registered target area' is defined according to the specification to be any area of the packaging that meets the requirements for non-occlusion during packaging and handling.

Claims 8 is rejected with respect to the term 'lidding film' for being indefinite as the Office feels it is "unclear whether a lid or a film is being claimed." As recited in the previous response, "the term lidding film is well known to those skilled in the art and is the proper term

for describing the subject matter of the claim. Once again, Applicant refers to *The Wiley Encyclopedia of Packaging Technology*; pages 440-442, section entitled Lidding and in *A Handbook of Food Packaging*, pages 136-137." A lidding film is a lid and it is also a film as defined in the art. However, Applicant has amended the claim for clarity and reconsideration is requested.

8.(Amended) The improved packaging material according to claim 1, wherein said polymeric material is a heat sealable [lidding film] <u>film forming a lid</u>.

Claims 10 and 11 were rejected by the Office as being indefinite in relation to 'upper portion' and 'lower portion'. Applicant has amended claims 10 and 11 and respectfully requests reconsideration. As noted in the specification, "[M]icroperforation arrays 100 are normally positioned near what will become the upper one-quarter or one-third of the bag, as shown in FIG. 2, so when filled packages are placed in case cartons they are not occluded by adjacent packages in the carton." Thus the upper portion refers to the location near the opening, and more specifically the claim refers to the upper one-quarter of the upper portion of the bag. Reconsideration is respectfully requested.

<u>*Claims Rejections - 35 USC §103 (a)*</u>

As previously articulated, "[o]bviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found in either the references themselves or in the knowledge generally available to one of ordinary skill in the art."

A useful presentation for the proper standard for determining obviousness under 35 USC §103(a) can be illustrated as follows:

1. Determining the scope and contents of the prior art;
2. Ascertaining the differences between the prior art and the claims at issue;
3. Resolving the level of ordinary skill in the pertinent art; and
4. Considering objective evidence present in the application indicating obviousness or unobviousness.

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The Office states that claims 1-3, 5-12, 14 and 21-22 are rejected under 35 USC 103(a) as being unpatentable over De Moor (U.S. Pat. No. 6,013,293) in view of Kurachi et al (U.S. Pat. No. 5,258,156).

As the Office acknowledges, DeMoor and Kurachi disclose packaging with MIRCOPOROUS FILM as opposed to the MICROPERFORATED FILM of the present invention. As previously noted, there is a considerable difference between microporous films and those created by microperforations. Whittington's Dictionary of Plastics (Technomic Publications, Lancaster, PA, 1993, pgs. 351-352) defines PERFORATING as:

"Any process by which a plastic film, sheet or tubing is provided with holes ranging from relatively large diameters for decorative effects (by means of punching or clicking) to very small, even invisible sizes. The latter are achieved by passing the material between rollers or plates, of which one of the pair is equipped with closely spaced, fine needles; or by spark erosion."

The Applicant describes in the Background of the Invention of the specification, "Various methods can be used to microperforate packaging materials: cold or hot needle mechanical punches, electric spark and lasers." These definitions of perforating do not include any reference to modifying the basic polymer film formulation or altering the process of film manufacturing, i. e., extrusion and orientation (stretching). Perforations are applied to a polymer composition that has been processed into a packaging film. Perforating is a secondary process applied to existing "off-the-shelf" film structures.

In contrast microporous films as disclosed by DeMoor and Kurachi are created by using a specific polymer formulation which includes filler particles that are used to create the micropores during the film orientation (stretching) process. Microporous films do not have microperforations since these films have not been perforated. These films have micropores. The micropores in the DeMoor and Kurachi films are not capillary structures typical of microperforated films. Instead, they are irregular-shaped voids produced by the filler particles

during film orientation as shown by the illustrations provided by the Applicant and labeled Figure 2 in the Response.

In particular, the Office cites Kurauchi as teaching a microporous film having microperforations. In support of this the Office references Col 1 lines 20-22 that states "For production of a microporous film, ie a film of a polymeric material (eg polyolefin) having a large number of microperforations, there is known, for example, a process comprising dispersing an easily soluable substance in a polymeric material, molding the dispersion into a film shape, and dissolving the easily soluble substance present in the film, in a solvent to remove the substance and form a large number of micropores in the film."

The process recited therein refer to MICROPOROUS films and does not refer to microperforations. The term is used again in Col 2 lines 26-32 – "According to the present invention, there is produced a process for producing a microporous polyolefin film having a large number of microperforations, by stretching, which process comprises stretching an unstretched polyolefin film to a predetermined strain amount at a constant stretching temperature by using different strain rates in the initial stage to the final stage."

As explained by the Applicant – this is an incorrect usage of the term. Microporous films have a plurality of voids throughout the film as shown by the illustrations provided by the Applicant and labeled Figure 2 in the Response. The scanning electron micrograph shows the properties of microporous films – stretching microporous films does not produce microperforations – when the term is used correctly as known to those in the art. Merely because Kurauchi incorrectly used a term, this does not provide a basis for having Kurauchi to teach microperforated films. The Applicant does not believe that the Office properly considered these differences in the rejection and has, therefore, compiled Tables 1 and 2 which repeat information included in the prior response.

Table 1
Comparisons between microporous film (used in DeMoor or manufactured by Kurachi) and microperforated film (according to Applicant)

	Microporous Film[1]	**Microperforated Film**[2]
Manufacturing Process	Primary film process: formulation, extrusion, orientation (stretching) process	Secondary treatment applied to any existing non-porous film structure
Hole Structure	Irregular, tortuous pores (Fig. 2 in the Response)	regular, cylindrical, capillary (Fig. 1 in the Response)
Hole Size	micropores are 0.24 microns (Kurachi)	perforations 110-400 microns
Practical methods used to measure hole size	Indirect methods: Bubble-Point[3] or Mercury Pressure Porosimetry[4] and Direct method: SEM[5]	Direct method: light microscope measurements
Primary gas transport mechanism	diffusion + evaporation	mass transport thru the perforations; diffusion + evaporation through the base film (non-perforated areas)
Liquid penetration	impenetrable	penetrable
Microbial penetration	impenetrable	penetrable
Oxygen flow rates	OTR of DeMoor control member =50M to 100M cc/100 in^2-day-atm	Total Flux = 150 cc/day-atm to 5MM cc/day-atm[6]
Thickness (mils)	1 mil to 25.6 mil (Clarke et. al)	0.4 to 8 mil
CO_2/O_2 ratio	2 to 4 (DeMoor)[7]	Ratio for microperforations: 1 Ratio for base film: 2.5 to 5.0[8]
Clarity	opaque	clear

[1]According to DeMoor & Kurachi
[2]According to Applicant
[3]The maximum pore size is estimated by measuring the gas pressure required to overcome the forces holding a wetting liquid within the pores.
[4]Pore size is estimated by determining the amount of mercury penetrating the pores as pressure is applied.
[5]Scanning electron microscopy (SEM) can be used to estimate the pore size distribution but it is not a practical QC method.
[6]Total $Flux_{O2\text{-}total} = OTR_T \times A_s$, where OTR_T is the total oxygen transmission rate required for the produce-specific package in cc O_2/m^2-day-atm, and A_s is the breathable surface area of the package in m^2.

[7]DeMoor achieves this ratio by coating the microporous film with an acrylate.
[8] CO_2/O_2 ratios of the base films that are microperforated are determined by their intrinsic chemical composition. See Table 2.

Table 2
CO_2/O_2 ratios of plastic films[1,2]

Film Type (1 mil thick)	O_2 permeance (cc/100 in^2-day-atm)	CO_2 permeance (cc/100 in^2-day-atm)	Ratio of CO_2/O_2
Low density polyethylene (PE)	500	2700	5.4
PE-EVA (ethylene vinyl acetate)	840	6000	7.1
Oriented Polypropylene (OPP)	160	540	3.4
OPP, PVDc-coated	2.5	2.5	1.0
Polyester	4.5	20	4.4
Polystyrene	300	900	3.0
Polyvinyl chloride	600	250	0.4
Saran (PVDc)	3.5	20	5.7

[1]From "Plastic Films Technology and Packaging Applications", Technomic Publishing, Inc., Lancaster, PA, pgs. 233-234, 1992, and "Wiley's Encyclopedia of Packaging Technology," pgs.50-53, John Wiley & Sons, Inc., NY, 1986.

[2]The CO_2/O_2 permeability ratio for polymer films can range from 1 to 42. The Applicant has demonstrated in Example 5, Figure 7 of the specifications that an optimum range of 2.5 to 5.0 exists for fresh produce packaging to prevent package distention or collapsing. If the ratio is too low, excess CO_2 accumulates inside the package causing distension. If the ratio is too high, not enough CO_2 accumulates inside the package so the package collapses. Microperforations in a film have a CO_2/O_2 ratio of 1. Therefore, to control the amount of CO_2 inside a produce package made with microperforated film, the appropriate CO_2/O_2 ratio for the base material (the non-perforated portions) must be used.

Per the telephone interview, the Applicant has amended claim 1 to show that the original film is non-porous and that the microperforations are created in the film to control the atmosphere of the contained respiring produce. The microperforations are drill holes extending thru the polymeric material as opposed to the tortuous pathway of micropores created by the voids formed during the stretching process used in making microporous films.

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1.(Amended) An improved packaging for establishing optimum atmospheric conditions for respiring produce, comprising:

a non-porous polymeric material;

a set of microperforations on said polymeric material, wherein said set of microperforations are drill holes and control said optimum atmospheric conditions within specified O_2 and CO_2 concentrations for said respiring produce, and wherein said set of microperforations are placed in a registered target area on said polymeric material.

Having explained and described the differences between microporous films and microperforated films, the Applicant believes that the DeMoor, Clarke and Kurauchi patents are all traversed, and all claims are allowable. Applicant spent considerable time and effort in the first response in explaining the differences and respectfully requests reconsideration.

In summary, the present claims define the inventive subject matter of an improved packaging material that has microperforations on a non-porous material, wherein the microperforations are calculated according to the respiring fresh produce to optimize the oxygen transmission rate. And, wherein the microperforations are placed in a target area on the material. As described, the microporous film of the cited references employs lateral air flow and there is no 'target area' that can be employed. Microperforations are holes drilled into the packaging material and are normal to the packaging material and their location is selected to avoid occlusion.

Applicant believes the above amendments and remarks to be fully responsive to the Office Action, thereby placing this application in condition for allowance. No new matter is added. Consideration and allowance of all claims is respectfully requested.

Respectfully submitted,

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12. (Amended) The improved packaging material according to claim 1, wherein said registered target area is located in an area that prevents occlusion of the microperforations by product, labels or other packages.

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VERSION WITH MARKING TO SHOW CHANGES

IN THE CLAIMS

1.(Amended) An improved packaging for establishing optimum atmospheric conditions for respiring produce, comprising:
a non-porous polymeric material;
a set of microperforations on said polymeric material, wherein said set of microperforations are drill holes and [are calculated to] control said optimum atmospheric conditions within specified O_2 and CO_2 concentrations for said respiring produce, and wherein said set of microperforations are placed in a registered target area on said polymeric material.

8. (Amended) The improved packaging material according to claim 1, wherein said polymeric material is a heat sealable [lidding film] film forming a lid.

9. (Amended) The improved packaging material according to claim 1, wherein said polymeric material is formed into a semi-rigid container with a thickness greater than [8 mil] 0.25mm.

10. (Twice Amended) The improved packaging material according to claim 7, wherein said bag has an upper portion about an opening of said bag [and a bottom portion], and wherein said registered target area is a small identifiable area in an upper one-quarter of said upper portion of said bag.

11. (Twice Amended) The improved packaging material according to claim 7, wherein said bag has an upper portion about an opening of said bag [and a bottom portion], and wherein said registered target area is a small identifiable area in an upper one-third of said upper portion of said bag.

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